79. Apparatus as claimed in claim [20] 75, wherein said layer of piezoelectric material is poled normal [thereto] to the base sheet.

80. Apparatus as claimed in claim [20] 75, wherein said electrodes are formed on channel-facing surfaces of the walls.

REMARKS

This paper is in response to the final official action of September 27, 1999. This response is timely filed, as it is accompanied by a petition for extension of time to file in the second month, along with our check in the amount of $380.00 to cover the requisite extension fee.

Claim 79 has been amended for clarity, to correct an error in dependency, and to specify more clearly the direction of poling of the piezoelectric material. Claim 80 has also been amended to correct an error in dependency.

The allowance of claims 34-45 and 59-64 is noted with appreciation. The rejections of claims 67-69, 72, 73, and 75-78 are respectfully traversed. Reconsideration of the application as amended is solicited.

It is requested that claims 79 and 80 should be considered as elected claims, as they have been amended to depend from elected claim 75.

Claim Rejection Under 35 U.S.C. § 112, first paragraph

The rejection of claims 75 to 78 is respectfully traversed. The subject matter "transverse duct having an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing" is indeed found in the specification on page 6 and in Fig. 1, with the addition of material on page 5 and in Fig. 2. Applicants regret that references to page 5 and Fig. 2 were omitted previously, which made the position less clear than it might have been.

Fur further clarity, it is suggested that the examiner should have preceded the quoted limitation with the words "a defining surface of said" which appear in claim 75 immediately before the quoted words; since it is this defining surface which carries the parallel conductive tracks, the additional words are essential. Thus, the limitation in question reads:

> "... a defining surface of said transverse duct having an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing".

Considering now the disclosure in the present application in more detail, on page 5 (and not on page 6 as previously incorrectly stated), at three lines up from

the bottom of the page there is a reference to "... a substrate or channel closure sheet 14. The substrate has parallel conductive tracks 16 formed thereon at the same pitch interval as the ink channels."

The substrate is "a defining surface" which carries the tracks. The nature and spacing of the tracks is clearly set out.

Thus, the text clearly discloses the words quoted by the examiner.

Further, additional support is given by Figs. 1 and 2. As stated on page 5, lines 6-10, Fig. 1 is a longitudinal section of a droplet deposition apparatus, and Fig. 2 shows a section in the array direction on the line X-X of Fig. 1. Reference to Figs. 1 and 2 shows that sheet 14 is clearly a closure for the transverse duct 26, and also shows that the duct 26 is transverse to the channels 11a-11h. Fig. 1 shows one conductive track 16 because it is a longitudinal section and only one channel is shown, therefore only one conductive track is shown. Fig. 2 shows tracks 16 at the bottom of each channel 11, and therefore the tracks 16 are inevitably at intervals corresponding with the channel spacing.

Reference to Fig. 1 again shows that the substrate 14 forms a defining surface of the transverse duct 26, and it is this same surface which carries the conductive tracks 16.

Therefore Figs. 1 and 2 also show the wording quoted by the examiner.

Since claims 76-80 depend on claim 75, and since the limitation in claim 75 is clearly disclosed both in the text and in the figures of the application, it is submitted the application clearly provides enabling support for these claims, and withdrawal of the rejection in view thereof is solicited.

Double Patenting Rejection

The same invention double patenting rejection of claims 75-78 is respectfully traversed. Reconsideration is requested.

While many of the elements of claim 9 of U.S. 5,463,414 and claim 75 of the present application are common, this is only to be expected with a parent-continuation relationship. An important difference between the claims is that claim 9 has no reference whatsoever to "said defining surface comprising a glass or ceramic other than said piezoelectric material" as recited in claim 75.

Other major differences are that claim 75 is broader than claim 9 because, taking the order of appearance of the elements as that of claim 9, claim 75 has no limitation of poling direction, no channel closure sheet, no limitation on the positioning of the tracks with

respect to the channels, no limitation of there being a mechanical bond formed between the tracks and the electrodes, and since there is no closure sheet, no requirement of a sealing closure to the closure sheet.

These very substantial differences, applicant believes, traverse the argument of same invention type double patenting.

Claim Rejection Under 35 U.S.C. § 103

The rejections relating to claims 67-69 and 72-73 are respectfully traversed. It is respectfully submitted that the current claims are not obvious over Temple '028 in view of Bartky et al.

While Temple discloses "a high density multi-channel array, electrically pulsed droplet deposition apparatus comprising a plurality of modules each including a layer of piezo-material poled normal thereto, a channel for ink droplets, separating walls, electrodes, a channel closure sheet, a nozzle plate and a means for supplying liquid to the channels," there is no reference in Temple to solder or solder joints.

While Bartky teaches "a multi-channel array comprising a plurality of modules including a channel and separating wall wherein separating wall surface has an electrode which causes the wall to eject droplets upon shearing," and also discloses "drive circuits connected

to electrodes, and a manifold," there is no disclosure in Bartky of "a channel cover sheet having electrodes opposite the channel."

"Opposite the channel" cannot mean attached to the channel walls. It must mean on one or both of the base and cover walls, or at some other position.

Reference to Figs. 1-5 of Bartky shows that in each of these embodiments there is a base wall 20 and a cover wall 22. In all of the embodiments, walls of piezoelectric ceramic material extend between the base and cover walls. In Fig. 1 the walls comprise upper and lower parts 32 and 33 (column 4 line 41); in Fig. 2 a single piece of piezoelectric ceramic 52 is provided (column 6 lines 36 and 37), forming a cantilever actuator 50 (column 6 line 35), which also appears in Fig. 3. In Fig. 4 a single piece of piezoelectric ceramic is referenced 61 (column 6 lines 67 and 68) and in Fig. 5 an actuator wall 400 has upper and lower active parts 401, 402 (column 7 lines 17 and 18).

In each of these embodiments the actuator walls carry electrodes on opposite sides. These are references 38, 39 in Fig. 1 (column 4, lines 48 and 49); references 58 and 59 in Figs. 2 and 3 (column 6, line 40); with upper and lower electrodes 68, 69 and 68', 69' in Fig. 4 (column 7, lines 3 and 4) and with electrodes 403, 404, 405 and 406 in Fig. 5 (column 7, lines 20 to 22).

In none of these embodiments is there any electrode "opposite to the channels" or across the ends of the channel and carried by either of the walls 20 or 22.

In Fig. 3, the reference 541 indicates a compliant seal strip, see column 6, lines 59 and 60.

Referring to Fig. 9a, electrodes 619 and 621 are applied to the actuator wall surfaces (column 9, lines 3 to 5) and are also attached to a base wall 601 and top wall 602 (column 8, lines 60 to 61).

However, reference to the way in which this embodiment is made will show that at no time and in no step of the construction is there a channel cover having electrodes opposite the channels.

The construction of the embodiment of Fig. 9 is described in column 9, lines 31 onwards. There is a clear statement that "The printhead 600 is manufactured by first laminating pre-poled layers of piezoelectric ceramic to base and top walls 601 and 602, the thickness of these layers equating to the height of the wall parts 605-607. Parallel groves are next formed by cutting ... at the spacings dictated by the width of the channel 613 and spaces 615 ... The electrodes are next deposited ... on the surfaces of the poled wall parts ... and the wall parts 605, 607 are cemented together to form the channel 613 and spaces 615." Thus the channels 613 and 615 are formed by the cementing together of two grooves of half-

channel height, the half-height equaling the thickness of the wall parts 605 and 607.

The words "a channel cover sheet" must imply that there is a channel, i.e. an open channel, which is then covered by the channel cover sheet. At no time in Bartky is there anything which constitutes a channel cover sheet.

Since there is no channel cover sheet there can never be such a sheet with electrodes opposite the channels.

Further, the electrodes are formed on the walls of the channels, and at no time are the electrodes formed "opposite to the channels."

Consequently, since Bartky does not disclose a channel cover nor a channel cover having electrodes opposite the channels, his disclosure is not relevant to the present application, and cannot in any way render it obvious either in combination with Temple or any other prior patent.

Claim 67(a) clearly recites (a) "a plurality of parallel open topped channels", and (b) "a top cover" for these channels.

Similarly, claim 70 refers to a method of making a printhead as set out in claim 67. These steps naturally include the steps of (a) forming a plurality of parallel open top channels, and the step of (b) forming of a top

cover with a pattern of parallel metal conductors congruent with the open top channels.

Neither Temple nor Bartky separately nor taken together shows or makes obvious such open-topped channels and a separate top cover with such a pattern of parallel metal conductors.

Bartky also does not make any reference whatsoever to solder joints. Since neither Temple nor Bartky refers to solder joints, not only is the construction different as required by both the apparatus and the method claims, but one major integer in the current claim is completely absent in both items of prior art.

For all the foregoing reasons, it is urged that all elected claims 34-45, 59-64, 67-69, 72, 73, and 75-80 are in condition for allowance.

Entry of the foregoing amendments as limiting the issues and placing the application in better form for consideration on appeal is respectfully solicited.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, he is urged to telephone the undersigned at the indicated number.

Respectfully submitted,

MARSHALL, O'TOOLE, GERSTEIN, MURRAY & BORUN

February 14, 2000 By _____

James P. Zeller
Reg. No. 28,491

6300 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6402
(312) 474-6300